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ABSTRACT

Fourteen classrooms were grouped according to environmental format (open/mixed/traditional) and differences in teacher-student interaction patterns and perceptions of responsibility for outcomes assessed. As predicted, open classrooms showed the highest percentage of dyadic interactions. Also as predicted, open classrooms tended to show the lowest percentage of group interactions, highest percentage of interactions concerned with a student's individual work, and lowest percentage concerned with answering specific academic questions. Contrary to prediction, teachers of traditional classrooms rated students more personally responsible for failure than open classroom teachers. Finally, students in more open classrooms tended to perceive themselves as more responsible for success than students in traditional classrooms. Results are discussed in light of the philosophical bases which lead to the adoption of the open classroom format. (Author)

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Classroom Format as a Determinant of Teacher-Student Interaction Patterns and Attributions of Responsibility for Performance

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Classroom Format as a Determinant of Teacher-Student Interaction Patterns and Attributions of Responsibility for Performance

A number of studies have been conducted concerned with the relative impact of open versus traditional classroom formats using dependent variables ranging from attitude (e.g. Spodek and Walberg, 1974) to skill differences (e.g. Hearn, Burdin and Katz, 1973) among students. However, little research has been conducted which attempts to elucidate the microstructure of the teacher-student interaction process in classrooms of differing format. The primary purpose of the present study was to determine if differing classroom formats are associated with different contexts for student-teacher interactions. Specifically, differences in (a) the frequency of group versus individual contexts for instruction, (b) the frequency of teacher versus student initiated interactions and (c) the content of questions asked, e.g., whether questions focused predominantly on attempts to evaluate student progess versus questions focused on testing knowledge in a specific academic domain were assessed for systematic variation dependent on differing classroom environments.

A second purpose of this study was to evaluate the impact of classroom format on teachers' and students' perceptions of responsibility concerning academic success and failure. A student's attributions of responsibility for their own successes and failures have been shown to be related to the student's achievement motivation (Kukla, 1972). Teachers' perception concerning a student's responsibility for performance outcomes has been found to influence

the teacher's subsequent evaluation of a student's progress (Weiner and Kukla, 1970). To be specific, students who are high in achievement motivation feel greater personal control over whether they succeed or fail at academic tasks than do students low in achievement motivation. It can be argued that such a strong sense of control is a neccessary prerequisite to achievement directed behavior. Teachers, on the other hand, are more likely to give strong positive or negative evaluations to students whom they perceive as personally the cause of the academic outcome. It seems reasonable to assume that both the teacher's and student's cognitions concerning responsibility are influenced by the larger context in which they find themselves. Therefore, an assessment of the possible influences of classroom format on the participating individuals attributions of responsibility seems of great importance. Thus, the impact of classroom environment on (a) the teacher's perception of the student's responsibility for success and failure and (b) the student's perception of own responsibility for success and failure were evaluated.

Predictions regarding the patterns of relation among the above variables can be derived from the philosophic underpinnings upon which open education is based. Since one of the major purposes for instituting an open classroom is to create a context for more individualized learning, there should be less interaction between teachers and students in groups and more interaction between teachers and students in one-to-one, dyadic settings in open as oppposed to traditional classrooms. Further, since student, as opposed to teacher, initiated learning is emphasized in open classrooms,

students should initiate more interactions with teachers in this environment than in the traditional environment. Also, based on this premise, the role of teacher in an open classroom should be more that of a monitor or evaluator of student progress than that of an active communicator of knowledge. Interactions in open classrooms should, therefore, show more of a tendency to be concerned with an individual student's rate of progress than with the student's answering of specific academic questions.

If the above assumptions are correct, we should also expect that the differing philosophies underlying differing classroom environments have implications for the cognitive functioning of both teachers and students. Specifically, teachers of open classrooms should perceive students as more personally responsible for success and failure than traditional classroom teachers, since open classroom teachers likely view their own role in performance as less active. Also, students in open classrooms should perceive themselves as more responsible for success and failure than students in traditional classrooms, due to less intervention in performance by open classroom teachers.

In sum, the present investigation attempts to empirically measure the implications of different classroom formats for (a) the nature of teacher-student interactions, and (b) teacher and student attributions concerning successful and unsuccessful academic performance.

Method

Classroom Selection

Fourteen teachers at a middle class, rural elementary school serving grades kindergarten through 2 were asked to allow their classrooms to be observed. There were a total of 29 classrooms in the school. No classrooms with solely kindergarten students were asked to participate. The school had, several years prior to this study, instituted an open education program on an individual basis. That is, the nature of the classroom environment was left up to the discretion of the individual teacher. Given this opportunity, teachers at the school had opted for a wide range of environments, exemplified by the extremes of no traditional student desks in the classroom to fixed, assigned student desks. Further, some of the classrooms in the school were "family grouped" (i.e., served students at more than one grade level) while others served only students in a single grade. The 14 classrooms sampled represented all points along these most objectively identifiable classroom format dimensions.[1]

Target Interactions

Nine students (for whom interactions with the teacher would be observed) were randomly chosen from each participating classroom. Students at kindergarten level in family grouped classrooms were excluded from the sample. Males and females were sampled randomly and no other limitations on the sample were employed.

Classroom Observation

Observations of eight of the classrooms were carried out in the spring of 1975 and six of the classrooms in the fall of 1975.[2]

Eleven undergraduate elementary education, two psychology and one sociology major served as observers. Observers were trained in the use of the Brophy and Good (1969) system for coding teacher-student dyadic interactions. Discussion and video tapes of simulated classrooms were used as part of the training procedure. Observers were paired and one hour was spent in each of two classrooms with each member of the pair independently coding teacher-student interactions. Reliability was assessed by dividing the total number of identical observational agreements by the total number of agreements plus disagreements and ommissions by either observer. The criterion of acceptible reliability suggested by Brophy and Good (1969) was .80 and actual observations were not begun until all pairs had reached this level. Each classroom was then observed for a total of five hours over the course of one week.

Open Education Criteria

The criteria for the ranking of classroom format are stated here defining the open end of the open-traditional dimension:

1) Classroom Environment
   a) rich in manipulative materials
   b) classroom extends beyond the confines of four walls
   c) elimination of rows of desks and chairs
   d) existence of "learning centers" within the room
   e) unable to spot quickly the teacher's desk as separate and distinct from student's work areas
2) Absence or de-emphasis of "chalk and talk", up-front teaching; more small group, individual activity; learning by doing, manipulating; extensive use of the five senses.

3) A more pronounced heterogeneous, family-type, vertical grouping; youngsters of varying ages, achievements or abilities.
4) De-emphasis, elimination of striving for grades.
5) Student's choice as to when and on what to work; emphasis on integrating several disciplines; controls to make teacher aware of student's not getting a balanced program.
6) No sharp distinctions between work and play.
7) Different avenues available for the child to learn basic skills, i.e., reading may be learned by language experience approach, basals or other.

Open Education Rating Procedure

At the time the first eight classrooms were observed, these classrooms were rank ordered by the school's principal using the open education criteria defined above. At the time the second six classrooms were observed these classrooms were rank ordered. Finally, one month after all observations were completed all 14 classrooms were rank ordered together. Having each classroom ranked on two occasions allowed for an assessment of test-retest reliability. This reliability coefficient proved large and strongly significant ($r=.89$, $df=13$, $p<.001$).[3]

Dependent Measures

Classroom Behaviors. Seven classroom behavior measures were created from the classroom observation frequencies.

A teacher-student interaction was coded whenever a question was directed to a specific individual and the teacher was either the initiator or receiver of the communication. Thus, general remarks by the teacher addressed to a group of students or inter-

actions between two students were not coded. Interactions between teachers and students were initially coded into two general types. Interactions were coded as academic whenever the content addressed work related matters or as procedural when non-academic (i.e. classroom routine, personal hygiene,etc.) matters were involved. Academic interactions were further categorized with regard to the context and initiator of the interaction and with regard to the complexity of the question asked.

An academic interaction was coded as a response opportunity whenever the teacher asked a student an academic question the answer to which the teacher intended to have overheard by a group of students. The defining characteristic of a response opportunity is that the exchange is public in nature. Interactions not intended to be overheard by a group of students (i.e., private, one-to-one interactions) were coded separately dependent on whether the exchange was initiated by the teacher or student. Thus, three types of academic interactions were defined differentiated according to context and initiator: response opportunities, child created interactions, and teacher afforded interactions.

Each academic interaction was also coded differentially dependent on the content of the question asked, with three types of content defined. An interaction was coded as a process question whenever the question asked involved the derivation of an answer, i.e., steps had to be gone through in order to solve the problem or answer the question. These questions are mostly of the "why" and "how" variety,i.e. "how do we take care of plants?" An interaction was coded as a product question whenever the question

required a single word or short phrase as an answer, essentially a statement of fact. "Who", "what", "where", "how much" and "how many" were considered product questions, i.e., "Who was the first president of the United States?" An interaction was coded as a self reference question whenever the teacher asked a student to show the teacher the student's work or whenever the student brought work up to the teacher to be evaluated.[4]

Rather than use absolute frequencies as dependent measures, it was decided to create percentage measures from the raw data for each classroom. This was done to reduce any effects in the data caused by the differing times of observations and possible differences in training between the two sampling periods. For each classroom, the total number of interactions was calculated by adding together the academic and procedural interactions. A percentage of academic interactions measure was created by dividing this quantity into the number of academic interactions. For the types and levels of academic questions, the frequency of each category was divided by the total academic interactions for each classroom. Thus, classrooms, and not students, is used as the unit of analysis (N=14).

Perceived Personal Responsibility. Each teacher in the first sample (N=8) received a questionnaire in the mail which was in no way associated with volunteering for the "teacher-student interaction" study. The questionnaire asked the teacher to provide a rating of the relative influence of personal and environmental factors in the performance of each of the nine target students.

This measure would indicate the degree to which the teacher's cognitive perceptions of personal responsibility were related to the openness of the teacher's classroom.

On the questionnaire, personal factors were defined as "things about the student himself/herself" which affect academic performance, for example, "the student's ability and/or effort." Environmental factors were defined as "something about the problem or general circumstances" which affect academic performance, for example, "how difficult or easy the problem was and/or the general factor of chance."

Separate ratings for the success and failure of each student were obtained. The rating scale was divided into seven points: point 1 was labelled "completely controlled by environmental factors", point 7 was labelled "completely controlled by personal factors" and point 4 was labelled "equally controlled by both." Ratings could therefore vary from 1 to 7, the higher the rating the greater the perceived influence of personal factors relative to environmental in academic performance. Teachers were asked to complete the ratings with a general success outcome or a general failure outcome in mind. The order of student presentation on the questionnaire was randomly determined. Success ratings always preceeded failure ratings.

Locus of Control. Each observed student in the six classrooms of the second sample (N=6) was administered a twelve question subsample from the Intellectual Achievement Responsibility scale (Crandall, Katkovsky & Crandall, 1965). The IAR measures the extent to which children view success and failure at achievement

tasks as caused by internal, personal reasons or by significant others in their environment. Questions are forced choice format, with the internal cause scored as "plus 1" and the environmental cause scored as "0". Six of the selected questions addressed success outcomes and six addressed failure outcomes. Thus, each student's responses created a success and a failure subscore. Both scores could range from "0" to "6", the higher the score the more frequently personal responsibility was taken for the outcome.

Results

Classroom Behaviors

A one-way analysis of variance was used to test differences in the percentage of interactions measures. Three levels of classroom openness were employed: the five classrooms rated most open comprised an open group; the five classrooms rated least open comprised a traditional group; the four classrooms ranked in the middle constituted a mixed group. Table 1 presents the means,

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Insert Table 1 about here

F-statistics and associated probability level, and a measure of effect size, eta, for each interaction percentage measure. The effect size is given because the relatively small size of the sample creates the possibility that large differences between groups may prove nonsignificant. Eta can be interpreted as analogous to a correlation coefficient, though systematic non-linear effects will increase eta's size. An eta of .3 is conventionally considered an effect of moderate size (see Cohen, 1969). The two

degrees of freedom associated with the three levels of openness were not decomposed into single degree of freedom contrasts because of the exploratory nature of the present investigation.

The analyses revealed that classroom format does not seem to affect the percentage of interactions of an academic nature in the class. However, both the context and type of academic interactions do show effects attributable to format. Open classrooms tend to show a lower percentage of response opportunities ($F(2,11)=2.18$, $p<.16$; eta=.56) and a higher percentage of teacher afforded interactions ($F(2,11)=9.27$, $p<.005$; eta=.79) than mixed or traditional classrooms, while child created interactions are relatively equal across formats. Further, questions asked in open classrooms tend more often to focus on the state of student progress ($F(2,11)=3.41$, $p<.07$; eta=.62) and less often to require a product-type answer ($F(2,11)=2.43$, $p<.14$; eta=.55).

Perceived Personal Responsibility

Inspection of the openness rankings of the eight teachers receiving this questionnaire showed that their classrooms tended to fall in the middle ranks of the sample. Therefore, the four classrooms in these eight ranked most open were designated the open group and the four ranked least open were designated the traditional group.

A repeated measure analysis of variance was carried out on the responsibility measures means for each classroom. Success or failure was the within units factor and classroom format was the between units factor. Table 2 presents the mean responsibility for success and failure ratings per student for the two classroom

format groups. The analysis revealed a trend for classroom format,

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Insert Table 2 about here

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indicating that teachers of more traditional classrooms tended to assign more responsibility for performances to students than did teachers of open classroom ($F(1,7)=4.12$, $p<.1$).

One way analyses of variance were then carried out for the success and failure measures separately. No difference was found between the open and traditional classroom teachers' ratings of perceived personal responsibility for success. However, teachers of the more traditional classrooms rated students more personally responsible for failure than did teachers of the more open classrooms ($F(1,7)=6.77$, $p<.04$;eta=.70).

Locus of Control

The six classrooms receiving this questionnaire were categorized into three levels of openness (open/mixed/traditional) with two classrooms at each level. A repeated measures analysis of variance was carried out on the mean IAR scores for each class. Success or failure was the within units factor and classroom format was the between units factor. Table 3 presents the mean IAR scores

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Insert Table 3 about here

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for success and failure per student for each category of classroom format. The difference between classroom means within each classroom format by success/failure condition was extremely low, producing

a highly significant success/failure main effect and success/failure by classroom format interaction. Interpreting these results seems unwarrented since the smallness of the error term involved is most likely a function of the small sample size. The success/failure main effect, however, accounted for 93% of the within units variability, indicating that students held themselves less responsible for failure than for success.

A one way analysis of variance was then performed on the IAR success and failure scores separately. Classroom openness tended to be positively associated with the student's sense of responsibility for success ($F(2,5)=6.16$, $p<.08$; eta=.84) indicating that students in traditional classrooms may take less responsibility for success than students in mixed or open format classrooms. Further, while the F-statistic does not approach significance, there was a large effect associated with responsibility for failure, such that students in open classrooms appear to assume more responsibility for unsuccessful outcomes than do students in traditional classrooms. A sample of larger size is called for to adequately test this conclusion.

Discussion

Results concerning the percentage of different interactions in classrooms of varying format were essentially supportive of the proposed hypotheses. Open classrooms tended to show a lower percentage of group interactions than other classrooms and a higher percentage of teacher initiated, one-to-one interactions. Interestingly, the percentage of child initiated interactions was relatively constant across formats. It appears that although

interactions in open classrooms occur more frequently in a dyadic setting, teachers of open classrooms do not, in general, relinquish their role as initiator of contacts with students. This interpretation suggests that teachers of open classrooms still attempt to maintain control over when interactions with students occur although this control occurs within a more individualized context.

The content of interactions also varied with classroom format in the predicted direction. Open classrooms tended to show the greatest percentage of questions dealing with a student's personal work and the lowest percentage of questions requiring product-type answers. These effects confirm the hypothesized shift in open classrooms of the role perception of the teacher from that of active communicator of knowledge to monitor of student progress. Finally, it should be noted that the interaction measures do not show linear relationships to the degree of classroom openness. This finding indicates that there may be qualitative differences which define boundaries for different learning environments (or qualitative shifts in role perception on the part of the teacher) which strongly affects classroom interactions, rather than a gradual shift from one end of the openness dimension to the other. That is, the shift from traditional to open environments may be a threshold type phenomenon.

The teachers' ratings concerning the responsibility of their students for success and failure produced results opposite to those predicted. It was hypothesized that teachers of open classrooms would attribute more responsibility for outcomes to students than teachers of traditional classrooms. Yet, the results indicate the opposite was true, with the difference mainly due to traditional

classroom teachers rating students more responsible for failure than open classroom teachers. A possible explanation for this finding may be that teachers who have chosen open formats for their classrooms are generally more sensitive to, or perceive as more salient, the influences of environment on behavior. Indeed, this perception may be part of their original motivation for selecting the open format. Whatever the reason, the results indicate that a classroom structure which attempts to place the initiative for learning upon the student is not necessarily accompainied by a teacher's relatively stronger belief that students within this setting are the primary cause of their own academic behavior.

The analyses of the students' own perceptions concerning responsibility (IAR scores) produced results generally supportive of the prediction that students in open classrooms would view themselves as more responsible for performance than students in traditional classrooms, though this effect is more pronounced for success than for failure. The authors are hesitant to draw strong conclusions about this relationship from the present small sample, especially in light of results which seem to indicate that mixed classroom students show IAR scores similar to open classroom students for success and traditional classroom students for failure. High perceived personal responsibility for academic performance, in many ways, represents one of the cognitive objectives of open education. The importance of a clear, strong test of this objective is therefore imperative. While the present data suggest that open classrooms are associated with greater perceived personal responsibility, we can only hope that this investigation will prompt a

more thorough, systematic evaluation of the relationship between classroom format and student self-perceptions in general.

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Footnotes

[1] Clearly, teachers were free to choose the format of their classrooms and were not randomly assigned to formats. Personality characteristics of the teacher are therefore confounded with the openness of the classroom. It is unlikely, however, that random assignment of teachers to formats will ever be feasible or desirable. The reader is urged to read all references to classroom format as intended to mean "classroom format and/or those characteristics of teachers covarying with choice of format."

[2] The differing times of observations was neccessitated because data were collected as part of a large research program requiring use of different classrooms at different phases. The method used to mitigate problems arising form the differing times of observation and observer training are addressed below.

[3] The fact that independent judges were not used to rank classrooms is a failing of the present study. However, it should be noted that the school principal was a doctoral candidiate in elementary education with specialization in open education.

[4] More detailed desciptions of these interaction categories can be found in Brophy and Good (1969). The self reference definition was altered slightly to make it as appropriate as possible for the needs of this investigation.

Table 1

Mean Percent of Interaction and Associated Statistics

For Each Classroom Format

	Classroom Format					
Type of Interaction	Open	Mixed	Traditional	F	p	eta
Academic Interactions	.67	.71	.71	0.08	n.s.	.12
Response Opportunities	.07	.23	.26	2.18	.16	.53
Child Created Interactions	.40	.56	.48	1.29	n.s.	.42
Teacher Afforded Interactions	.53	.22	.26	9.27	.005	.79
Process Questions	.02	.07	.04	1.51	n.s.	.47
Product Questions	.51	.80	.69	2.43	.14	.55
Self Reference Questions	.47	.13	.26	3.41	.07	.62

Note. F-statistics and significance levels are based on 2 and 11 degrees of freedom; N=14.

Table 2

Perceived Personal Responsibility Means for Each Classroom Format and Performance Outcome Condition

	Classroom Format		
Performance Outcome	Open	Traditional	Mean
Success	4.78	4.92	4.85
Failure	4.25	5.14	4.69
Mean	4.52	5.03	

Note. Means are based on average ratings for each of eight classrooms; higher scores indicate greater relative personal responsibility. Means for open and traditional classrooms differ significantly in perceived personal responsibility for failure ($p < .04$).

Table 3

IAR Means for Each Classroom Format and Performance Outcome Condition

	Classroom Format			
Performance Outcome	Open	Mixed	Traditional	Mean
Success	4.17	4.23	3.44	3.95
Failure	2.72	2.13	2.33	2.39
Mean	3.45	3.18	2.88	

Note. Means are based on average ratings for each of six classrooms; higher scores indicate greater personal responsibility. IAR scores for success condition are significantly different ($p < .08$).